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The Effect of Aggressive and Prosocial Video Games on Aggressive and Prosocial Behavior

Valerie L. Scelsa
Trinity College, valerie.scelsa@trincoll.edu

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ABSTRACT

The relationship between video games and aggressive and prosocial behavior has been a topic of special interest for psychologists, as it may have important implications for society. Research has suggested that violent video games increase aggressive behavior, and prosocial video games increase prosocial behavior (Adachi, Good and Willoughby, 2012; Brauer, Greitemeyer and Osswald, 2010). However, the literature on aggressive behavior is somewhat conflicting and the research on prosocial behavior is relatively recent. Therefore, the current study aimed to fill in some of the gaps in the current literature by examining the effect of prosocial and aggressive video games on prosocial and aggressive behavior. Participants were given the Buss-Perry Aggression Questionnaire and Self-Report Altruism Scale to measure individual characteristics. They were then randomly assigned to one of the following three games: *Monster Shooter 2: Back to Earth* (aggressive), *Ants: Mission of Salvation* (prosocial) or *Monkey Ball 2* (neutral) and, afterwards, engaged in a Prisoner's Dilemma task in order to determine the game's influence on their aggressive or prosocial behaviors. It was hypothesized that students assigned to play*Monster Shooter 2:Back to Earth* would display more aggressive behavior in the Prisoner's Dilemma task and students assigned to play*Ants: Mission of Salvation* would exhibit more prosocial behavior in the Prisoner's Dilemma task. Results indicated that there was no significant relationship between game type and behavior. The implications of this research for the field of psychology are discussed.

INTRODUCTION

Overview

The influence of the media and technology on individuals has been a great concern to both psychologists and the general public. While research has focused on all types of media, video games have gained special interest, possibly because they require more active involvement on the part of the consumerthan other types of media. Playing video games is also quite common in the United States, with about fifty-eight percent of Americans playing video games, having an average age of thirty(Entertainment Software Association, 2013).The role violent videogames play in aggressive behavior has been of special interest to many psychologists, partially because of the creation of very violent first-person-shooter games and the potential link between them and school shootings. First-person shooter games and other violent video games, such as *Call of Duty* and *Halo 4*, were among the top 20 best-selling video games in 2013 (Entertainment Software Association, 2013). In one of the most recent school shootings, which occurred at Sandy Hook Elementary in Newton, Connecticut, the shooter, Adam Lanza, was reported to be a frequent video game player. Some of the video games found at his house included *Grand Theft Auto*, *Call of Duty*, *Left 4 Dead*, *Dance Dance Revolution*, and *Kingdom Hearts*(Good, 2013a). Many of these games are quite violent, while others are not. However, the most notable game that was found in Lanza'a house is called *School Shooter: North American Tour 2012*, which involves exactly what it sounds like. The player enters into a school and shoots and kills all of the students and teachers and then is forced to commit suicide to avoid being caught by law enforcement(Good, 2013b).This finding alone suggests it is important to study the effect these types of games have on behavior because they are so popular and may have a larger impact on society than we realize. The effect prosocial games have on behavior is just beginning to be

studied. It may, however, have important implications for the promotion of prosocial behavior and the prevention of aggression.

The Social Learning Theory of Aggression

Aggression can be defined as an action performed with the intention to harm others (Anderson& Bushman, 2002). There are several different theories of aggression; onlythreeare specifically relevant to the study of video games. The social learning theory of aggression states that aggressive responses are learned through experience or through observation of the behaviors of others in real life and in the media. A closely related theory to social learning is script theory, which suggests that the way we learn from social experience is by developing scripts for certain situations; one, therefore,decides how to act based on the scripts related to the current situation. The more often scripts are rehearsed, the more powerful and accessible they become. This process may explain why video games increase aggression, especially in those who frequently play video games, since aggressive scripts are being repeated over and over again(Anderson & Bushman 2002). However, this theory has been criticized when used as an explanation for increased aggression in those who play video games or even those who watch a lot of violent TV shows or movies. The criticism is based on the assumption that an individual cannot differentiate between fantasy and real life when selecting the best script to model (Ferguson& Rueda, 2010). Anderson & Bushman (2002) developed the General Aggression Model (GAM) as a response to some of the shortcomings of script theory. The GAM attempts to integrate the different theories of aggression into a single model, which describes how aggressive behavior develops.While elements from the social learning theory are a large part of the model, it also includes other variables that determine whether or not someone will act aggressively, including an individual's

present internal state, beliefs and attitudes relating to aggression, and individual personality characteristics.

Violent Video Games and the Social Learning Theory: Conflicting Evidence

Many studies have investigated the effect of violent video games on aggression based on the social learning theory; the results have been inconclusive. A study by Anderson and Dill (2000) had students play a violent and a neutral video game, and afterwards, they engaged in a competitive reaction time task. The goal of this task was to push a button faster than your opponent; the loser received a loud noise blast. Before the game began, the participant was asked to choose the loudness of the noise blast his or her opponent would receive. There was no actual opponent in this task, but the participant did not know that because the process was computer based. Anderson and Dill(2000) found that participants who played a violent video game acted more aggressively in the reaction time taskby choosing louder noise blasts than the participants who played a neutral game. They also measured participants' aggressive thoughts right after playing the game and found that those playing the aggressive game reported more aggressive and hostile thoughts. These results provide support for social learning theory and the GAM because theysuggest that violent video games affect cognition and create aggressive scripts, which then may lead to aggressive behavior.

While Anderson and Dill's (2000) study focused on short-term effects, a number of longitudinal studies have also been conducted. Willoughby, Adachi and Good (2012) administered a survey to eight high schools yearly from 2003 to 2008. The survey included questions about frequency of video game play, violent video game use, aggression, deviance, and grades. Researchers found that students who had sustained violent video game playing had the steepest increase in aggressive behavior, even when controlling for otherpossible influences,

such as peer deviance. This suggests that the effects of violent video games on aggression are not only short-term, especially if their use is consistent and continuous. The results of this study provide support for the social learning theory because it found that violent video game playing precedes aggression. If playing violent video games came after aggressive behavior, it would suggest that those who already have aggressive traits chose to play more aggressive video games, but the opposite was true, suggesting the students learned their aggressive behavior from playing violent video games.(Willoughby, Adachi & Good, 2012).

Another longitudinal study done by Ferguson, San Miguel, Garza, and Jerabeck (2012) found the opposite results. Participants, who were in middle school or high school, took a survey three times over a three-year period. The survey included questions about violent video game play, negative life events, and depression. They found that violent video game use was not related to aggression; rather the best predictors of aggression were peer influence, depression, family violence and antisocial personality traits. It is difficult to know why the results of these two studies were so different. The study by Ferguson et al (2012), however, was done over a slightly shorter period of time than the Willoughby et al. (2012) study. It is possible that it takes longer than three years for violent video games to show a significant effect. Additionally, violent video game use was measured very differently. In the study done by Ferguson et al. (2012) they asked participants to list their three favorite games and how often they played them. It is possible some participants played violent video games, but did not report it, and that some participants had more than three games they played often. Willoughby et al.'s (2012) study had participants indicate whether or not they played different categories of games (e.g. Action/Adventure or Strategy) and the frequency of play. The measures of aggression were also different; Ferguson et al (20120) measured more serious aggression than Willoughby et al (2012). In fact, it has been

suggested that video games affect less serious aggression more than extreme acts of aggression, such as school shootings, because they must involve many risk factors (Carey, 2013).Most importantly, there was no sustained violent video game use variable in the study done by Ferguson et al. (2012), when that was the variable most significantly related to aggression in Willoughby et al.'s (2012) study.

A recent meta-analysis by Anderson et al. (2010) looked at theeffect of video game use on aggression in Western countries and Japan. They found that there was a significant causal effect; playing aggressive video games increases aggressive behavior, cognition and affect and decreases empathy and prosocial behavior. These results remained the same when selection bias was controlled for. However, Ferguson and Kilburn (2010)claimed that Anderson et al. (2010) did not sufficiently control for selection bias because many studies did not involve serious enough aggression and some unpublished studies were included. They also claimed that even without these methodological issues, the effectsize of the relationship between aggression and video game usewas very small.Ferguson and Kilburn (2010) also show that video game sales have been steadily increasing, while youth violence has been decreasing. However, they did not take into account the fact that most video game players are older than eighteen, so the decreasing youth violence may not be as relevant as they claim (Entertainment Software Association, 2013). Other published studies provide support the validity of Anderson et al.'s (2010)original results and methods and claim even the small effect size found in their study has significant implications, as it is similar to other risk factors for aggressive behavior such as substance abuse and poverty (Huesmann, 2010; Bushman, Rothstein & Anderson, 2010).

Differentiating Between Competitive and Violent Video Games

Several studies have investigated the question of whether competitiveness or violence in video games causes aggression. Adachi and Willoughby (2011) had participants play one of four video games. Two of the games were violent and two of them were non-violent. One of the violent games and one of the non-violent games were competitive and the other two were not. After the participants finished playing the game, they competed in the Hot Sauce Paradigm, which involved choosing the level of hot sauce to give to their opponent. The results showed that those who played the two competitive games acted significantly more aggressive than those who played the two non-competitive games. There was no difference between the two competitive video games or the two non-competitive video games, even though one was violent and the other was not. This suggests that it is competitiveness that fosters aggression rather than violence.

However, a study by Anderson and Carnagey (2009)found the opposite outcome: those who played violent video games acted more aggressively than those who played competitive ones. However, there were no non-competitive games because all games used were sports related. Those who played a more violent sports game displayed more aggressive cognitions and physiological arousal than those who played a non-violent one. The differences observed between these two studies could be a result of the different types of outcome measures. Adachi and Willoughby (2011) measured aggressive behavior, while Anderson and Carnagey (2009) measured aggressive cognition. It could be that violent video gamesincrease aggressive cognitions, but are less related to aggressive behavior, at least in the short-term.

Video Games and Aggression: Alternative Theories

Even though social learning theory is most often used to explain the effects of violent video game use on aggression, alternative theories do exist, such as the catharsis hypothesis,

which is based on the idea thataggression is biologically inherent in all people and that it can be displaced in healthy and unhealthy ways(Feshbach, 1984). The catharsis hypothesis suggests playing video games is a healthy way to vent aggression and, therefore, individuals feel calmer and less hostile after they play. Another alternative theory is that the mood management theory, which states that playing video games is not related to aggression at all. Rather they are simply used as a leisure tool to cope with stress (Ferguson and Rueda, 2010).

While very little research has been done on these theories, one study by Ferguson and Rueda (2010) attempted to compare the two theories. Participants completed a frustration task before playing one of four video games of differing levels of violence (from very violent to non-violent). Afterwards, they measured aggression using the competitive reaction time task and depression and hostile feelings. They found no link between playing violent video games and aggression, but playing violent video games did decrease depression and hostile feelings. This provided confirmation for themood management theory rather than the catharsis hypothesis. Support for the catharsis hypothesis would have existed, if those who played the violent game acted less aggressively than those who played the neutral one. Although, because the results were only correlational, more research needs to be conducted before a definitive conclusion about these alternative theories can be asserted.

Prosocial Behavior

More recently, researchers have begun to study the effect of playing video games on prosocial behavior. Prosocial behavior includes a wide collection of behaviors that are viewed as beneficial to others by society or one's social group. Studies have suggested that there is a genetic predisposition for prosocial behavior and that it may be evolutionarily advantageous. For example, if one acts altruistically towards a stranger, it is likely he or she will act altruistically in

return. One theory of how prosocial behaviors occur is based on social learning theory and suggests that people develop helping behaviors through socialization and observational learning (Penner, Dovidio, Piliavin & Schroeder, 2005). While not directly applied to the effect of video games on prosocial behavior, it is reasonable to postulate that the social learning theory underlies the development of prosocial behavior.

Evidence That Playing Prosocial Video Games Increases Prosocial Behavior

Greitemeyer, Osswald and Brauer (2010) had participants play a prosocial game or a neutral game. Afterwards, they were asked to read three vignettes or personal essays about something bad happening to someone and to report how empathetic they felt towards the author of the essay and whether or not they experienced pleasure from reading about another's pain (schadenfreude). Their predictions were confirmed; those who played the prosocial game reported feeling more empathy and less schadenfreude after reading the vignettes than those who played the neutral game. Gentile et al. (2009) gave out a survey to Japanese fifth graders twice during a four-month time spanabout prosocial video game exposure and prosocial game use. Their results were similar to those of Greitemeyer, Osswald and Brauer (2010); prosocial gaming and prosocial behavior at time one, was correlated with prosocial gaming and prosocial behavior at time two. This is evidence that there may be a bidirectional relationship between prosocial video game use and prosocial behavior, meaning that prosocial gaming increases prosocial behavior and vice versa.

Some studies have focused on how prosocial video games increase prosocial thoughts, since previous studies have shown that playing aggressive video games may increase aggressive thoughts (e.g. Anderson & Dill, 2000). A study by Greitemeyer and Osswald (2010) had participants play a prosocial game or a neutral game and then asked them to write down all of the

things they were thinking about while playing the game. They found that those who played the prosocial game reported having more prosocial thoughts than those who played the neutral game. What this study did not test was whether these prosocial thoughts continued after the game was finished. Greitemeyer and Osswald (2011) followed up with another study where participants were told they would take part in two pilot studies, one about the enjoyment of classic computer games and another about recognizing words. The two studies were actually related. After playing either a prosocial or a neutral game they were tested on the speed they could recognize words that were prosocial or neutral in nature. The participants who played prosocial video game responded faster to prosocial target words than to neutral words or non-words. This suggests that playing prosocial video games increases an individual's ability to access prosocial thoughts. This is important because if these prosocial thoughts are repeatedly accessed through prosocial video game play,they may create and strengthen prosocial scripts, which may then lead to prosocial behavior, similar to the way aggressive games may increase aggressive behavior according to the GAM.

Why is the literature on aggression controversial, while literature on prosocial behavior is not?

Abundant contradictory evidence exists for the relationship between violent video games and aggressive behavior. In contrast,all of the research on prosocial video games' effect on behavior seems to be relatively consistent, showing that prosocial video games increase prosocial behavior. There are several potential reasons for these different findings. Perhaps, because violent video games are so popular and widely used today, people are uncomfortable with the idea that they can increase aggression. Therefore, it is much more likely that people would want to look for other ways that playing video games may have positive effects (e.g., the catharsis

hypothesis) (Huesmann, 2010). Research has, however, shown prosocial games to have a positive effect on behavior and, consequently, no alternative hypotheses have been generated.Additionally, since finding no significant effect when studying the influence of violent games on aggression would suggest these games are not harmful for society, it may be more likely for them to be published than studies that show prosocial games have no effect on behavior. In the case of prosocial games, studies with significant effects may be more likely than studies with non-significant effects to be published because their findings have positiveimplications. In fact, Francis (2012) argued that publication bias does exist for experimental research, suggesting that research with significant results is reported more often than research that is not significant.

Comparative Studies onThe Effect of Prosocial and Aggressive Games

Some studies have focused on the effects of both prosocial and aggressive video games on prosocial behavior. Greitemeyer and Oswald (2010) had participants play a prosocial, aggressive or neutral game. Afterwards, the experimenter dropped pencils on the floor and found that participants who played the prosocial game were more likely to help the experimenter pick the pencils up and those who played the aggressive or the neutral game were equally less likely to help. A study by Gentile et al. (2009) also had participants play a prosocial, aggressive or neutral game. However, once they finished, they engaged in a task involving puzzles to measure prosocial behavior. There were thirty puzzles (ten easy, ten medium, and ten hard) and the participants were asked to choose eleven of the puzzles to give to their partner. If the puzzles were completed in ten minutes, then their partner won a gift card. Those who gave their partners easier puzzles were rated as more cooperative. They found that those who played the prosocial game were the most helpful and those who played the violent game were the least helpful.

A study by Annie Jin (2011) found slightly different results. First, participants were asked to write three sentences about values they believe they should hold or ways they should act, in order to access their morality. Then, after playing a prosocial, aggressive, or neutral game, participants filled out a questionnaire about the empathy they felt towards their video game character. They were also asked how likely they were to volunteer at the psychology lab again in the future and how much money they would be willing to donate to the lab. Annie Jin found that those who played the prosocial game reported feeling more empathy towards their character than those who played the violent game. However, surprisingly, those who played the violent game reported being more likely to volunteer in the future and donate more money. The researcher explained this finding using the self-discrepancy theory, meaning that those who played the violent game offered more money because they were trying to get rid of the discrepancy between their actions (playing the violent game) and their moral values, which were primed at the beginning of the experiment.

There is also evidence that prosocial games not only increase prosocial behavior, but also may decrease aggressive behavior. Greitemeyer, Agthe, and Gschwendtner (2012)asked participants to first write a personal essay and soon after they received very critical feedback from a partner who was actually a confederate. Then, after playing a prosocial, aggressive or neutral game, participants played the competitive reaction time task, seemingly against the confederate who gave them negative feedback. The sound blasts chosen were significantly higher for those who played the aggressive game and significantly lower for those who played the prosocial game. In a second experiment participants were first asked to complete a visual analogy task to help a doctoral student with her research. Then they played one of three games, which were the same as the previous study, and afterward received negative feedback from the

graduate student about their visual analogy task. They were then asked to fill out a questionnaire on aggressive affect and cognition and to evaluate the doctoral student who gave them bad feedback. Those who played a prosocial game had the least amount of aggressive cognition and affect and also judged the doctoral student the least harshly. This suggests prosocial behavior may actually suppress aggressive responses.

Research Implications

There is an abundance of research concerning the effect of violent games on aggressive behavior, yet experts still do not agree on the exact nature of this relationship. Some researchers have found evidence, based on social learning theory,demonstratingthat playingviolent video games increases aggression. However, other researchers carrying out similar studies have found no evidence of this relationship. Some researchers have proposed alternative theories such as the catharsis hypothesis or the mood management theory to postulate positive aspects of playing violent games. Therefore, it is important that research continues in this area to determine the exact nature of the relationship between video games and aggression, or if there is one at all.

While there is very little current research on the effect of prosocial video games on behavior, unlike research on violent video games, virtually all of this research shows that prosocial video games increase prosocial behavior. However, research needs to continue in this area to ensure that this relationship is accurate. Additionally, prosocial behavior encompasses a wide range of actions and the few studies that have been done focus on different aspects of prosocial behavior such as cooperation or altruism.

Finally, the way that people play video games has been changing with the invention of smartphones and tablets. In fact, thirty-six percent of gamers play games on their smartphone and twenty-five percent on a wireless device (Entertainment Software Association, 2013).People

probably spend shorter periods of time playing games on their smartphones than they would on a gaming console and they may also have very different reasons for playing. Additionally, children are being exposed to these games at a much younger age, as parents use smartphones and tablets as a way to distract or console their young children. It is important to determine if these types of devices influence behavior differently than playing on a game console or a PC.

Current Study

The aim of the current study was to explore the effect of both prosocial and violent video games on both prosocial and aggressive behavior, since previous research in these areas have either been inconclusive due to conflicting evidence, or insufficient. Additionally, most previous studies comparing both prosocial and aggressive games have only focused on their effect on either prosocial or aggressive behavior. Therefore, the current study adopted a Prisoner's Dilemma measure from Pilisuk, Potter, Rapoport, and Winter (1965)that allowed participants to act eithercooperatively or competitively. Lastly, participants played the games on an iPad rather than a PC or a gaming console because no studies have been done using this technology that is becoming increasingly popular. Gender was also a variable that was focused on in this study, but not the focus of this paper.

Hypotheses

The following hypotheses were generated based on the findings of previous research:

H1: Participants assigned to the aggressive game will act the most competitively in the Prisoner's Dilemma task.

H2: Participants assigned to the prosocial game will act the most cooperatively in the Prisoner's Dilemma task.

METHOD

Participants

Participants in this study were undergraduate students at Trinity College, in Hartford, Connecticut. There were forty participants in total; twenty-five were female and fifteen were male.

Procedure

Participants were first given a short survey about video game playing behaviors and attitudes, as well as aggressive and altruistic personality traits. After a day or more, the participants came to the lab to complete the rest of the study in pairs. Participants were randomly assigned using a block design to play the prosocial game, the aggressive game, or the neutral game. Each pair of participants played the same type of game.

When the participants arrived at the lab, the experimenter first briefly explained how to play the assigned game to both participants (See Appendix A). Then they were told to go into separate rooms and play the assigned game for ten minutes. After the ten minutes were up, the participants were again brought into the same room where the Prisoner's Dilemma task was explained by the experimenter (See Appendix B). After it was clear that the participants understood the task, the incentive was explained to them. The person who received the most points from the Prisoner's Dilemma task got two tickets that would be entered into a lottery to win a twenty-five dollar Visa gift card. However, it was also possible to tie and, in that case, each participant would be awarded one ticket to be entered into the lottery. If both participants received zero points, which would only happen if both participants flipped over zero coins, then neither of them was entered into the lottery. They then returned to their separate rooms and were

given about two minutes to complete the task. The winner was determined and then the participants were debriefed.

Questionnaire

Demographic Questions

The questionnaire that was competed before video game play contained demographic questions about participants and their videogame use. These included questions about sex, class year, frequency of video game use, type of video game use (Action, Adventure, Sports, etc.), reasons forplaying video games, and when video game use began (See Appendix C).

Buss-Perry Aggression Questionnaire

In order to measure aggressive personality traits, participants were given the Buss-Perry Aggression Questionnaire (BPAQ) created by Buss & Perry (1992). Thisquestionnaire, comprised of twenty-nine self-report items, is basedon a seven point Likert scale ranging from“extremely uncharacteristic of me” to “extremely characteristic of me.” This scale consists of four subscales to measuredifferent types of aggression: physical aggression, verbal aggression, anger, and hostility. The scores of each subscale were determined by a sum of the responses and an overall score was also determined by a sum of all responses (See Appendix D). The Cronbach’s alpha for physical aggression was .78, verbal aggression was .69, anger was .40, and hostility was .55; the Cronbach’s alpha for all items together was .88.

Self-Report Altruism Scale

Participants were also given the Self-Report Altruism scale developed by Rushton, Chrisjohn, and Fekken (1981) to measure altruistic personality traits. This is a twenty-item questionnaire that asks about the frequency one has carried out various altruistic acts on a five

point Likert scale ranging from "never" to "very often." The scores were determined by a sum of their responses (See Appendix E). The Cronbach's alpha for these items was .90.

Video Games

Aggressive Game: Monster Shooter 2: Back to Earth

Monster Shooter 2: Back to Earth is the aggressive iPad application that was used in this study. In this game, the participantsplay as a monster character and their goal is to shoot and kill all of the other monsters. Once all of the monsters are killed, players move on to the next level. This game is one of the few available for the iPad that asksplayers if they are at least thirteenyears old before it begins.

Prosocial Game: Ants: Mission of Salvation

Ants: Mission of Salvation was the prosocial game in this study. In this game,players guide a group of ants to their home by assigning them certain tasks (e.g. climber, builder, digger). Many previous studies using prosocial games have used a computer game called *Lemmings*, which has the same basic premise (Greitemeyer et al., 2012; Greitemeyer & Osswald, 2010; Greitemeyer & Osswald 2011).

Neutral Game: Super Monkey Ball 2: Sakura Edition

Super Monkey Ball 2: Sakura Edition was used as the control in this study. In this game, the participants play as a monkey character encased in a transparent ball and have to find their way through a series of mazes. This game has been used in other studies as a neutral game, but it was slightly different and played on a video console not an iPad(Gentile et al., 2009).

Measure of Aggressive and Prosocial Behavior: Prisoner's Dilemma Task

The Prisoner's Dilemma task was the dependent variable in this study; it was used to measure prosocial and competitive behavior (Pilisuk, Potter, Rapoport, and Winter, 1965).

Participants had the option of flipping over zero, five, ten, fifteen, or twenty coins. Flipping over more coins meant that they were giving their partner more points. Therefore, the participants who flipped over twenty coins were being the most cooperative and the participants who flipped over zero coins were being the most competitive. See Appendix F for the payoff matrix given to participants and Appendix B for a more detailed explanation of the task.

RESULTS

A univariate ANOVAwas conducted to test the effect of type of video game and gender on prosocial and aggressive behavior measured by Prisoner's Dilemma responses. The scores on the Prisoner's Dilemma task were recoded to a 1 to 5 scale, rather than 0, 5, 10, 15, and 20, to make a continuous variable. A score of 1 would be considered the most aggressive behavior possible and a score of 5 would be considered the most prosocial behavior possible. There was no significant difference in the outcome of the Prisoner's Dilemma task based on the type of game that was played (See Figure 1),F (2, 34) = 2.23, p = *n.s.*, MSw = 3.90, η^2 = .12. There was also no significant main effect for gender F (1, 34)= 0.35, p = *n.s.*, MSw = 0.61, η^2 = 0.01. Lastly there was no significant interaction effect between type of game and gender F (2, 34) = 1.94, p= *n.s.*, MSw = 3.40, η^2 = 0.10.

In order to determine if individual characteristics of aggression and altruism were related to scores on the Prisoner's Dilemma task, two Pearson R correlations were conducted. Individual scores in the Buss-Perry Aggression Questionnaire were not related to scores on the Prisoner's Dilemma task, r (38) = -.12, p = *n.s.* Scores on the Self-Report Altruism Scale were also not related to Prisoner's Dilemma scores, r (38) = -.06, p = *n.s.* (See Table 1). Also, scores on the BPAQ were extremely variable, although the means for men (M = 86.13, SD = 21.58) and

women (M = 73.16, SD = 23.03) were relatively consistent with the scale norms. The mean and variability of the SRA scores were consistent with the norm (M = 56.37, SD = 9.44).

DISCUSSION

Contrary to my hypotheses, there was no significant effect of type of game played on prosocial or aggressive behavior in the subsequent Prisoner's Dilemma task. It is possible that video games do not have an effect on behavior, but it is more likely that the various methodological limitations inthis study prevented significant results. This is because all of the previous literature on the effect of prosocial games on prosocial behavior has found a significant effect. Additionally, although the literature on the effect of violent video games on aggressive behavior is more conflicting, most of the literature on short-term effects of violent video games on less serious aggressive behavior has been significant, which is what our study focused on. Most of the contradictory results occur when measuring long-term effects or focusing on very serious acts of aggression (Carey, 2013; Ferguson, San Miguel, Garza, and Jerabeck, 2012; Ferguson and Kilburn, 2010).

I also measured aggressive and altruistic traits to see if they would be better predictors of performance on the Prisoner's Dilemma task. However, neither SRA scores nor BPAQ scores were correlated with Prisoner's Dilemma scores. It is possible that performance on the Prisoner's Dilemma may be more closely related to different traits such as impulsivity, selfishness or even intelligence. In fact, one study found that those who were more intelligent were more likely to act competitively in a Prisoner's Dilemma task (Kanazawa & Fontaine, 2013). This may have important implications for the results of this study, considering the fact that all participants were undergraduate students. It is also important to note that the SRA and BPAQ scores were not

related to each other. This may be because prosocial behavior and aggressive behavior are not necessarily opposites. Someone can be highly aggressive in one situation, depending on the events and the people present, and act very altruistic in another (Gentile et al., 2009).

Methodological Limitations

One of the biggest limitations to my study was the small sample size, as I only tested forty individuals in total, which was an even more salient problem in this study because of the many testing conditions. Another limitation was that the participants only played the assigned game for ten minutes, and although this has been enough time to produce a significant effect in a few studies, most studies have participants play the game for fifteen to twenty minutes. Therefore, it is possible that ten minutes was too short to produce a significant effect on behavior in the Prisoner's Dilemma task.

The terms prosocial and cooperative and aggressive and competitive were used interchangeably. However, in reality they are not synonymous. Cooperation is only one kind of prosocial behavior that involves individuals working together for the good of the group. There are many other kinds of prosocial behavior including altruism, which involves helping others at no benefit to you (Penner, Dovidio, Piliavin & Schroeder, 2005). The Prisoner's Dilemma task did measure cooperation, but not any of the various other kinds of prosocial behavior. Additionally, not all competition is aggressive, as it often does not involve the desire to harm another person. The Prisoner's Dilemma task measures competition, but not necessarily aggression because an individual who acted competitively most likely did it to win the gift card for themselves, not to prevent the other person from winning.

It is also possible that the aggressive video game was not aggressive enough. However there are no games available for the iPad that were as violent as the games used in previous

research. Most violent games in past research have also involved harming other people and the game used in this study involved monsters, which may have suppressed aggressive behavior. Since gender was used as a variable, however, I tried to control for potential gender effects by only using games with animals or non-human characters.

Future Research

Since prosocial behavior and aggression are such broad categories, it may be beneficial to do a study with multiple measures that encompass various types of prosocial and aggressive behavior, to see ifvideo games affectthe distinct types of aggression and prosocial behavior differently. The measures of aggressive behavior currently available are very limited, although this is partly due to ethical issues. There are many different measures of prosocial behaviors used, but few studies have used more than one in order to compare them.

The types of prosocial games available at present are limited and may not be as accurate or representative of prosocial behaviors, as the aggressive games are of aggressive behaviors. Future studies may want to consider a multiplayer game that requires the player to help one another, although this may be difficult considering most of these games also involve some kind of aggressive behavior as well. Also, a new genre of games called empathy games have been created in the past couple of years. These games attempt to portray difficult aspects of the human experience to foster empathy in people. One game in particular, called “That Dragon, Cancer”,was created by Ryan Green and attempts have the player experience what it was like for him raising a young child with cancer (Larchuck, 2014). Although these games were created to increase empathy in people, they have yet to be tested. Future studies may want to test the effect empathy games actually have on empathy and prosocial behavior.

Finally, this is the first study on video games' effect on behavior that used iPads rather than a gaming console or computer. It is possible that the reason I found no significant results is because something about the way that people play games on a tablet has less of an effect on behavior, although no conclusions can be made about this because of the small sample size. However, future studies may want to have participants play the same game on a gaming console and the iPad to see if they have the same effect on behavior.

Conclusions

Although this study did not generate significant findings, research still needs to continue to explore the effect video games have on behavior. Video games are often criticized for being harmful and creating aggressive behavior; the relationship, however, is not that simple as aggression stems from numerous sources other than media influence, including personality traits, motivations, and situational characteristics(Anderson & Bushman, 2002). Additionally, prosocial video games have been largely ignored, when they may have very positive effects on individual behavior.Most especially, research needs to be done on the effect of prosocial video games, and if the results continue to be positive, parents should be encouraged to expose their children to prosocial games at a young age. This may promote prosocial behavior, and also possibly prevent aggressive behavior.

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Tables

Table 1

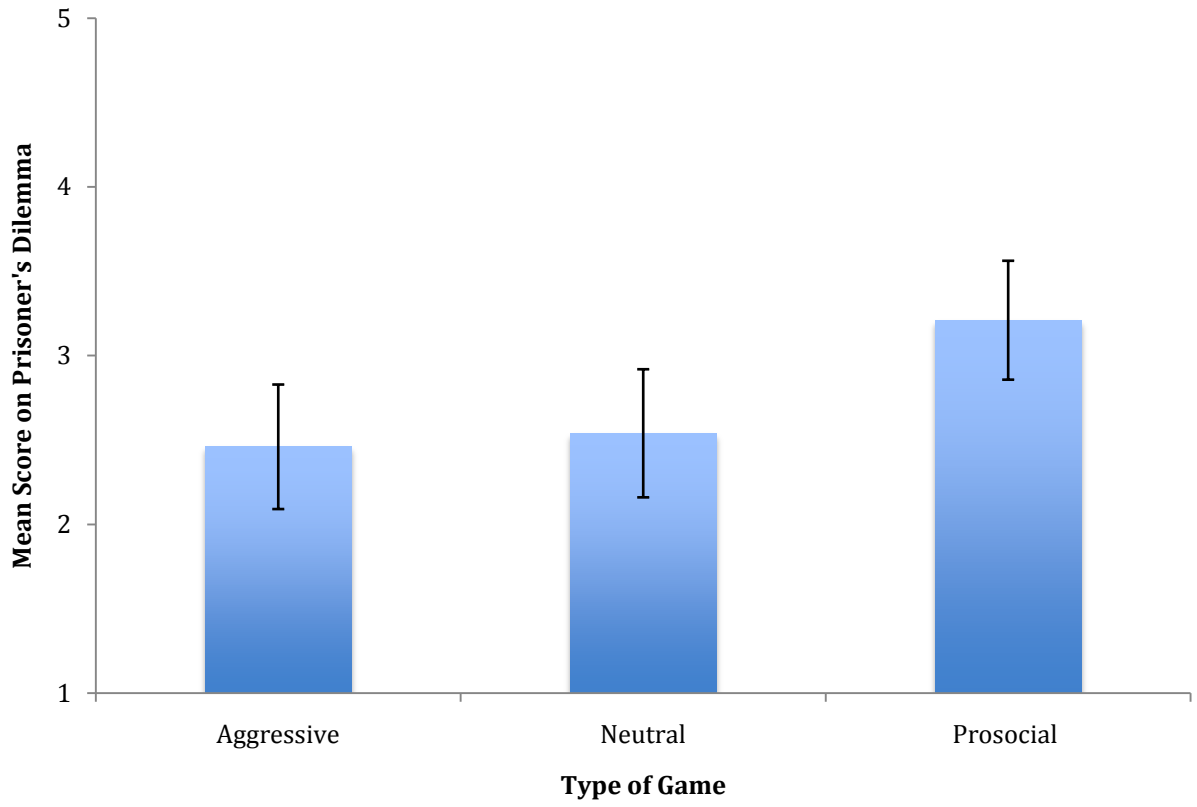
The Relationship between Prisoner's Dilemma responses, Aggressive Traits, and Altruism

Measure	1	2	3
1. PD	—		
2. BPAQ	-.12	—	
3. SRA	-.06	-.15	—

Note: PD = Prisoner's Dilemma Task; BPAQ = Buss-Perry Aggression Questionnaire; SRA = Self-Report Altruism Scale

Figures

Figure 1. Effect of Game Type on Prisoner's Dilemma Responses



Appendix A

Game Instructions

Monster Shooter 2 (aggressive)
In this game, you are going to be able to move your character around by moving around a finger on the blue circle on the left hand corner, and you will be able to shoot by pressing down on the red circle on the right hand bottom corner. The goal is to kill all the monsters. In between levels, the game might ask you to buy guns. If that happens, just skip it. If you have any trouble, feel free to ask us any questions.

Super Monkey Ball 2 (neutral)
In this game, you need to tilt the screen to make the monkey reach the goal. To orient yourself, look at the bottom left corner and make sure the red dot is in the center of the axis. After each round, your actions will be replayed for you, so if you want to skip them up just tap the screen. Also, if you fall a certain number of times, it will ask you if you want to continue, so please click yes until your time is up. If you have any trouble, feel free to ask us any questions.

Ants: Mission of Salvation (prosocial)
Tap to choose an item on the bottom to help the ants get back to their home. Once you click an item it will turn red and stay activated until you choose another action. In the early levels, certain items will be locked based on which ones you're going to need to help the ants. A confusing part of this game is that sometimes you will need to zoom out in order to see the area that the ants are moving in. If you don't know how to do this, we can show you. You can always restart a level by pressing the arrow in the upper middle part of the screen. If you have any trouble, feel free to ask us any questions.

Appendix B

Prisoner's Dilemma Instructions

In this second part of the study, you will be playing a game with a partner. We will explain to you both the task out here and then you can go back into the room you were in for the game playing. We ask you not to speak to each other during this time.

This is a pay-off matrix. On the left side is the number of coins that you can choose to flip over, and on the top is the number of your coins that your partner could flip over. You flip over coins in factors of 5, so you can flip over 0, 5, 10, 15, or 20. In each square, the top triangle shows the number of points you will gain, and the bottom triangle shows the number of points your partner will gain.

You do not know what your partner is going to flip over, so you will have to make your decision independently.

An easier way to understand this is to see the number of coins you are flipped over, as the number of points you are giving your partner. For example, if you both choose to flip over 20 coins, you will each be giving each other 20 points. If you both choose to flip over 0 coins, neither of you will be giving each other any points. If one of you chooses to flip over 10 coins, and the other chooses to flip over 20, the person who chose to flip over 20, is giving their partner more points than they are receiving. So, here's an example.

Do you think you can tell me how many points you receive if your partner flips over 15 and you flip over 5?
Do you think you can tell me how many points you receive if your partner flips over 5 and you flip over 0?

You both will only play this game once.

Lastly, whoever wins this game will have the chance to win a $25 VISA gift card. If you beat your partner, we will put two tickets with your name into the lottery. If you end up tying with your partner, we will put in a ticket each of you. If both of you get 0 points, then no one will be entered into the lottery.

Do you have any questions?

Then we are ready to begin. Once you have flipped over the number of you coins that you choose to, please wait quietly till we determine the score.

Appendix C

Demographic Questions

Question	**Possible Responses**
Please indicate your gender.	1- Male 2- Female 3- Other
Please indicate the year you are expecting to graduate.	1- 2014 2- 2015 3- 2016 4- 2017
Please indicate your cumulative GPA.	
How much time do you typically spend playing video games each week? (Including games on a gaming system, computer, iPad or smartphone)	1- 0-2 hours 2- 3-6 hours 3- 7-12 hours 4- 13 or more hours
What types of video games do you play? (You may choose more than one answer.)	1- Action 2- Adventure 3- Strategy 4- Sports 5- Other (please specify)
Please list three video games you play most often.	
When did you start playing video games?	1- Elementary School 2- Middle School 3- High School 4- College
Why do you play video games? (You may choose more than one answer).	1- As a hobby 2- To pass time 3- To connect with other people 4- As an escape from problems or stress 5- Other (please specify)

Appendix D

Buss-Perry Aggression Questionnaire

Directions: Please rate each of the following items in terms of how characteristic they are of you. Use the scale below for answering these items.

1	2	3	4	5	6	7
Extremely uncharacteristic of me						Extremely characteristic of me

1) Once in a while I can't control the urge to strike another person.
2) Given enough provocation, I may hit another person.
3) If somebody hits me, I hit back.
4) I get into fights a little more than the average person.
5) If I have to resort to violence to protect my rights, I will.
6) There are people who pushed me so far that we came to blows.
7) I can think of no good reason for ever hitting a person.
8) I have threatened people I know.
9) I have become so mad that I have broken things.
10) I tell my friends openly when I disagree with them.
11) I often find myself disagreeing with people.
12) When people annoy me, I may tell them what I think of them.
13) I can't help getting into arguments when people disagree with me.
14) My friends say that I'm somewhat argumentative.
15) I flare up quickly but get over it quickly.
16) When frustrated, I let my irritation show.
17) I sometimes feel like a powder keg ready to explode.
18) I am an even-tempered person.
19) Some of my friends think I'm a hothead.
20) Sometimes I fly off the handle for no good reason.
21) I have trouble controlling my temper.
22) I am sometimes eaten up with jealousy.
23) At times I feel I have gotten a raw deal out of life.
24) Other people always seem to get the breaks.
25) I wonder why sometimes I feel so bitter about things.
26) I know that "friends" talk about me behind my back.
27) I am suspicious of overly friendly strangers.
28) I sometimes feel that people are laughing at me behind me back.
29) When people are especially nice, I wonder what they want.

Appendix E

Self Report Altruism Scale

Directions: Pick the category that conforms to the frequency with which you have carried out the following acts using the scale below.

1	2	3	4	5
Never	Once	More than once	Often	Very often

1. I have helped push a stranger's car out of the snow.
2. I have given directions to a stranger.
3. I have made change for a stranger.
4. I have given money to a charity.
5. I have given money to a stranger who needed it (or asked me for it).
6. I have donated goods or clothes to a charity.
7. I have done volunteer work for a charity.
8. I have donated blood.
9. I have helped carry a stranger's belongings (books, parcels, etc.).
10. I have delayed an elevator and held the door open for a stranger.
11. I have allowed someone to go ahead of me in a lineup (at photocopy machine, in the supermarket).
12. I have given a stranger a lift in my car.
13. I have pointed out a clerk's error (in a bank, at the supermarket) in undercharging me for an item.
14. I have let a neighbor whom I didn't know too well borrow an item of some value to me (e.g., a dish, tools, etc.)
15. I have bought 'charity" Christmas cards deliberately because I knew it was a good cause.
16. I have helped a classmate who I did not know that well with a homework assignment when my knowledge was greater than his or hers.
17. I have, before being asked, voluntarily looked after a neighbor's pets or children without being paid for it.
18. I have offered to help a handicapped or elderly stranger across a street.
19. I have offered my seat on a bus or train to a stranger who was standing.
20. I have helped an acquaintance to move households.

Appendix F

Your partner's pennies turned over

Your pennies turned over	**20**	**15**	**10**	**5**	**0**
20	20 / 20	10 / 25	0 / 30	-10 / 35	-20 / 40
15	25 / 10	15 / 15	5 / 20	-5 / 25	-15 / 30
10	30 / 0	20 / 5	10 / 10	0 / 15	-10 / 20
5	35 / -10	25 / -5	15 / 0	5 / 5	-5 / 10
0	40 / -20	30 / -15	20 / -10	10 / -5	0 / 0